Foreword

The Audit Committee Institute of KPMG in India (ACI) is pleased to release this Point of View (POV) titled “Revenue Assurance in Highway Toll Management”.

The infrastructure story in India has only just begun and within this sector, road infrastructure is a key focus area. The Ministry of Road Transport has announced ambitious plans to build 20 kms of roads in India every day. Implementation of this vision is impossible without the active participation of the private sector.

A number of road development projects through Public Private Partnerships (PPP) are currently underway. However, it is also true that private investment in roads is falling short of the targets. Private road developers depend largely on highway toll collections as a medium to recover their investments and currently toll collections in India are fraught with challenges. Revenue leakages including uncollected toll charges on Indian roads are very high and this is a major deterrent to private investment in roads.

This POV is an attempt to explore and zero in on the key issues in the area of highway toll management. Unreliable traffic estimation processes, predominance of cash as a mechanism to collect toll, lack of smart cards/tags and electronic toll collection systems, standardized approach to vehicle classification, inadequate regulatory oversight, lack of effective IT systems and inter-operability i.e. the inability of multiple developers and regulators to adopt common systems for tolling are some of the key issues around revenue leakages in toll collections.

Through this POV, we would like to stimulate a dialogue on potential solutions that will work in the Indian eco-system. In setting the ball rolling in that direction, we have included a perspective on good practices in highway toll management from around the world comprising both the developed and other emerging markets.

We hope that the various stakeholders in the development of Roads infrastructure comprising Regulators, Developers and the users will find this POV interesting and useful in the context of plugging revenue leakages in highway toll collections.

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Traveling by road from Mumbai to Delhi takes approximately 35 hours. Conversely, if one travels by road from Chicago to Houston in the US, it would take less than 22 hours. The striking part here is that the distance between the cities in US is more than that of India!

Did you know?

• India boasts of the second largest road network in the world - Total length of roads in India is 3.3 million km
  ✓ However, 40 percent of the road length is not surfaced and 40 percent of its villages do not have access to all weather roads
• The average daily distance covered by a truck in India is about 300 km - World average 600-700 km¹
  ✓ The average speed on highways is around 25-40 km/hr - Global average is 60-70 km/hr
• Roads in India account for 85 percent of the total passenger traffic and 65 percent of the total freight traffic²
  ✓ According to Planning Commission, losses from traffic congestion and poor roads alone are as high as INR 300 bn
• Studies prove that
  ✓ Fuel consumption increases by up to 56 percent if the speed of a truck falls from 45 to 20 km/hr on highways due to congestion³
  ✓ If the road quality in India is improved then it is estimated to decrease the fuel bill by 20 percent⁴

Private investments in roads

According to the World Bank, it will become unmanageable to sustain the present rate of economic growth unless immediate action is taken to provide a good quality road network throughout the country. For instance, ports with poor road connectivity are not able to take full advantage of efficiency at the port. Weak and narrow roads are not strong enough to carry heavy power plant equipment leading to delays in power projects. On the other hand, India’s biggest competitor China’s exceptional growth and reduction in poverty is attributed to the expansion of expressway network and quality feeder roads connecting rural areas to highways/expressways.⁵

The government has recognized this as an area of immediate improvement as is evident from its spending plans in the Eleventh and

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¹ India’s trillion-dollar deal Report, CLSA, 2008
² India’s trillion-dollar deal Report, CLSA, 2008
³ Highways to prosperity, Business Today, 2010
⁴ Highways to prosperity, Business Today, 2010
⁵ Road development, economic growth, and poverty reduction in China, Fan and Chan-Kang, 2005
Twelfth five year plan. The government has proposed development of national and state highways during the next three years (2010-2012) with expenditure to the tune of USD 70 billion with the private sector share expected to be USD 40 billion.6

According to statistics released by the Ministry of Road Transport and Highways, the toll collections from national highways is expected to jump five-fold to INR 10,000 crore (INR 100 billion) in next four years and this is based on bringing an estimated 35,000 km of roads under the operate, maintain and toll system for private investors, a five fold increase over current levels. Road tolling is the only direct means of recovering costs for road agencies/developers and thus plays a major role in developing the road infrastructure in India. The toll income reported on the national highways in the year 2008-2009 was INR 26.13 billion, a 36.8 percent rise over the immediately preceding year.7

**Revenue leakages are a major concern for private developers**

According to the Mid-Term Appraisal (MTA) by the Planning Commission, just 16 percent of road project investments have come from the private sector. It appears that actual private investment is falling short of targets in the road sector.8

Developers need to better their chances of return on investments (ROI) and currently there are many impediments such as concessions in the road sector, land acquisitions, environmental clearances, inflexibility in the risk allocation of the Model Concession Agreement, and the difficulty in acquiring financing. The fact that Electronic Toll Collection (ETC) systems are not in vogue is also a major reason for very high leakages in revenue, estimated by the government to be as high as 20 percent.

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6 Roads: India expects $5 bn Canadian investment, Rediff News, 26th March 2010
7 Toll collection on National Highways rises by 36.8% in 2008-09, Dare Magazine, 7th June 2009
8 Targets Revised For 11th Five Year Plan, But Still Ambitious For 12th, Business Monitor Online, 2010
Revenue leakage issues

Did you know?

- Of the total highway network of 66,000 km in India, only 6,212 km (10 percent) is presently tolled.
- Build, Operate and Transfer (BOT) is the preferred mode of delivery with around 70 percent of the projects being developed under this model.
- Around 25,000 km of national highways are likely to be awarded on a BOT (toll) basis in the 2010-12 period.
- According to estimates, the government is losing over INR 15 billion annually due to leakages in toll collections.
- Of the total 143 tolled sections; only 53 are managed by the concessionaires, the remaining 90 are managed by NHAI appointed agencies.
- NHAI, on a pilot basis, awarded the toll collection job at 11 toll plazas to private parties and the revenue increased by 23 percent.

According to industry experts, as much as 30 percent of the incremental revenue has been recovered by project owners by applying enhanced revenue assurance systems for toll operations.

Unlike other developed and also emerging markets, in India, no single toll technology is adopted nationwide among toll operators. Few have initiated smart cards/tags at their toll plazas along with cash-based system. Further, customers are not incentivised for using smart cards/tags. A card/tag of one operator is not recognized by another toll operator system. This results in the issue of interoperability between different cards/tags of toll operators. Hence, the usage of ETC systems is limited and payments are made in cash making them more susceptible to revenue leakages.

Mentioned below are some of the issues that when addressed will significantly improve revenue assurance for toll operators.

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9 Toll collection between Delhi and Mumbai falls, Live Mint, 2009
10 Ministry of Road Transport & Highways
11 Nilekani may head panel for choosing toll technology, Zee News, 2010
12 Stricter rulebook for highway toll collectors, DNA, April 2010
**Inconsistency in revenue projections**

- Presently, the onus is on bidders to project long term revenues based on estimation of uncontrollable factors such as GDP growth and interest rate movements. There is no agency at the central/ state level that makes such data available to project bidders.
- There is no system/policy in place to validate the revenue projections and assumptions made by multiple bidders.

**Weak Motor Vehicle Act (MVA)**

- An electronic database of vehicle data across the country to track vehicle movements is absent. Consequently, it is almost impossible to bring defaulters to book.
- The legal framework for penalizing the toll defaulter is weak.
- In the case of indigenously developed ETC systems, standard specifications framework is absent.

**Ambiguity in concession framework**

- There are ambiguities within the Model Concession Agreement (MCA) on adoption of ETC systems at toll plazas when awarding road projects.

**Implementation issues of ETC\textsuperscript{13} system**

- Infrastructure facilities such as internet connectivity and utility power are not enabled at various toll plazas.
- Use of cashless system such as smart cards/On Board Unit (OBU) is optional rather than mandatory.

**Inaccurate vehicle classification**

- There is a lack of uniform system for classification of vehicles in India where the number of modified vehicles are large.
- Lack of clarity on exempt vehicle categories and robust processes around it.
- Inaccurate classification of vehicles by Toll Collectors leading to under tolling.
- Inability of the censor devices to differentiate a four-axle vehicle and modified two-axle vehicle.

**Rising threat from thefts at cash toll plazas**

- Inadequate access controls and closed-circuit cameras for surveillance of cash rooms at toll plazas.
- Lack of security measures such as armed security guards and locked collection booths.

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\textsuperscript{13} Refer appendix for an overview on ETC system
**Lack of toll management skills**
- Most of the Indian developers do not use toll management tools such as automatic boom barrier and overhead light signal.
- Lack of experienced toll staff including supervisors and managers

**Absence of stringent IT controls**
- Allowing unauthorized modifications to implemented system. For e.g. granting free passage to lanes, boom barrier malfunction.

**Customer inviability**
- Cost of smart tags/ transponders along with toll rates are an additional burden on the motorists in the absence of singular ETC systems.
- Fuel wastage due to long waiting time at cash toll plazas.
- Commercial truck operators resist paying toll as they are already paying motor vehicles tax and a cess on diesel and petrol.
- Absence of a common ETC technology (e.g. smart cards, tags, etc) and wireless communication standards adopted by different toll operators.
How the world does it?

Road projects across the globe have seen success through different mechanisms for toll development. Rapid technology adoption coupled with innovative and customer friendly policies have been the primary reasons for increased adoption of cashless systems by motorists in these countries. Toll operators across major markets are replacing manual tolling process with ETC systems to ensure greater acceptance and increased revenue assurance. For India there are 6 broad areas that emerge out from global good practices to address the current issues.

Enforceability
Strict legislation should be enforced on defaulters and severity of penalties should be directly proportional to number of offences and duration of the delay.

- Canadian road authorities face very low bad debts as defaulters are not allowed to renew their road tax at the end of the year and interest charged on outstanding payments is as high as 60 percent.

- In Slovenia, use of highways and expressways without a valid toll sticker is a violation of the law and is punished with a fine of €300 or more.

Technology enhancement
Use of ETC systems at all tolls across the country and ensure more and more users use a cashless system for paying tolls.

- In Singapore, toll transponder units known as an IU (In-vehicle Unit) are to be installed compulsorily in all vehicles by law leading to a very small error rate.

- In Brazil, the government has fast-tracked the passing of legislature for a nationwide automatic vehicle identification system based on the RFID ISO 18000 6C (6C) sticker tags.

- In US, toll operators have got together in an agreement for a single tag system (e.g. E-Z Pass) in 13-14 states to use the same technology through a hub and spoke model.

Standardization
A standard specification should be set out for developing ETC systems by different vendors across the country.

- Certain states in the US (e.g. Illinois) have implemented an Open Road Tolling program wherein around 80 percent of the daily drivers use E-Z Pass ETC system for barrier-free travel.

- In Norway, the back office software and roadside equipment for toll collection is developed by two national suppliers. The challenge
relating to **agreeing on system functionality** was coordinated by the National Road Authorities.

### Interoperability

Smart cards/ tags / OBUs should be made portable across ETC systems and toll operators.

- In Texas, four **different public sector agencies have signed up for common business rules and technology** wherein users of one can use another’s tags/ transponders.

- In Ireland, the interoperability issue is managed by a **central clearing house i.e. IEA** (Information Exchange Agency). Every six hours the vehicle data relating to billing of customers is sent by all toll operators to the IEA and vice versa.

### Customer viability

Make it affordable for the motorists to use cashless technologies by providing incentives and making the process convenient and user friendly.

- In Croatia, each class of vehicles pays **toll of around 1.5 times the toll paid by the previous class** leading to reduction in discrepancies between different vehicle classes.

- In Ireland, **prepaid account holders** are given **more incentives** while using tolls when compared to post-paid accounts thus reducing instances of revenue leakages / non payment of dues.

- To give incentive to tag users, authorities in Canada have implemented **different toll charges for transponder/ tag user which are lower compared to non tag users**.

### Regulatory coordination

Different government bodies such as national road agencies, state highway authorities, vehicle registrars, etc. should coordinate on toll policy formulation and its implementation

- In Brazil, a **public private partnership company** was formed with responsibility for nation-wide implementation of ETC and collection of toll charges. The system enables the identification and collection of vehicles/users on the occasion they use the tolls, and subsequent passing of the charge to the concessionaires.

- In Norway, 90 percent of all toll collection is done through either a tag in the car or through video surveillance. The picture or tag is read by the system and **charged to the car owner’s account** or the car owner is **invoiced based on information from the national car register**.

- In case of **exempt vehicles**, in Ireland **tags are provided** to such vehicles by different authorities. The toll bills are passed on to their respective authorities seeking exemption by the toll operator.
Highway toll management in India: Some possible solutions

The above clearly indicates that tolling systems are yet to find its feet in India. To start with, there is a need to gain an in depth understanding of the practices adopted globally in countries where the model is successful under similar circumstances. The fact that emerging economies such as Brazil and China have adopted many of the good practices implies that India needs to up the ante in this area. This does not however mean that we replicate these practices, but there is a need to adapt them to the Indian eco-system.

Making toll management a successful proposition in India would require integration of factors like proper planning, efficient mobilization of funds, correct revenue projections, risk analyses, technological integration, enhancements to the regulatory framework and a certain level of information sharing between the various authorities involved.

Robust legal framework a necessity to strengthen enforceability

- Government could implement a law for strong enforceability. Some of the actions that can be imposed on defaulters could be financial penalties, withdrawal of motorist license and cancellation of permits.

- To complement the legal framework, project owners should strengthen internal IT controls, operate boom barriers and record registration number of defaulters.

Revenue projection methodology should be standardized

- Shortlist / appoint a panel of companies that will carry out traffic estimation and outline revenue projection parameters.

- The regulator should conduct traffic estimation before hand and include it as a part of the Model Concession Agreement (MCA) while inviting new bids.

- Service level agreement (SLA) should stipulate how deviations from traffic estimation will be addressed.

Fast track implementation of a standard ETC system across India

- Fast track evaluation of a standardized ETC technology that can be implemented at a national level.

- Set up a separate toll management body which overlooks integration issues and dispute resolution in interoperability of toll operators.

- All project developers should agree upon common ETC rules and mechanisms.
Maximizing customer satisfaction

- Adopt the ETC system vs. cash/ manual to reduce time per transaction.
- Devise a “grievances cell” for quick dispute resolution of issues between toll operators, government and motorists.
- Customers could also be empowered with facilities like ‘top-ups on tags/ smart cards’ via the internet, telephone or SMS.

Periodic toll audits by NHAI

- Toll operators should formulate a system to record and regularly inspect toll revenues (reported vs. actual) and examine tolling operations.
- NHAI should perform surprise audits at the private toll plazas under BOT (toll) model verifying traffic and vehicle classification data at all toll plazas.

Measuring toll operator performance

- Road authorities should devise a policy to keep an annual check on toll operator performance. Parameters for evaluation can include expected vs. project revenues, quantitative measure of lane availability and measure of road conditions.
- Toll operator should evaluate different pricing mechanisms such as congestion pricing, charging higher toll on heavy vehicles and overloaded trucks and different rates for pre-paid versus post-paid billing.

Facilitating adoption of new technologies

- A list could be provided to all toll operators based on the number plate of the exempt vehicles which is updated regularly by central vehicle agency to reflect in their ETC systems.
- Based on the traffic volume on a particular highway project, regulators can make a provision of providing free tags/cards on high traffic roads as the cost could be recovered by the traffic volume flowing through these roads.
- Toll operators should offer Fleet owners (e.g. transport companies/truckers) an incentivised single tolling account and multiple affiliated sub accounts. This would help the companies to manage their tolling costs and track their fleet on a regular basis.
- To reduce the burden of initial costs, motorists could be offered transponder/tags at a lease with a small upfront fee and the rest on monthly lease payments of over a 12 to 24 month period.
Conclusion

To plug revenue leakages in toll collections, Indian companies along with government will need to mutually resolve the current interoperability issue through one single payment card/ tag for all toll roads across the country.

In view of making road projects more beneficial to the private sector, the government needs to trim down the associated policy risks. To make projects more profitable the government could take a leaf out of the power sector and follow the return on equity model which would ensure a fixed return for the investors. On the regulatory front, the Motor Vehicle Act (MVA) should coordinate with a centralized body like the Toll Regulation Authority to ensure that all existing and new vehicle registrations are tracked. This tracking system should include classification of all new/ modified vehicles under four-five classes and no more.

The toll operators would need to be aggressive in implementation of ETC systems. These systems should comply with mutually accepted business rules and technology across all the toll operators. At the same time, the operator should keep a check on internal and IT controls for minimizing revenue leakages. Motorists should be made aware of legal actions in case of non-payments of toll. The toll rates should be justifiable based on parameters such as time of the travel (night/date/peak hour), weight of vehicle, etc.

For the government to accomplish its zealous target of 20 km a day or INR 10,000 crore of toll revenue in the next four years it will have to incorporate aggressive policy changes for seamless growth of the road sector in India.

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Appendix

Understanding Electronic Toll Collection (ETC) System

Electronic toll collection is a technology that allows electronic payment of tolls. ETC systems are an improvement over conventional toll collection techniques. Advances in electronic toll collection (ETC) during the last 10 to 15 years have made all electronic tolling (AET) a practical way to collect tolls or implement road pricing strategies.

AET requires no manual toll collection booths and instead uses gantries or other technologies to identify vehicles using the toll facility. Once the vehicle is electronically identified, the driver/owner’s account can be charged or payment collected in some other way. Tolls are collected without vehicles stopping or slowing at toll booths. ETC can be done through different technologies such as:

- License plate recognition
- Radio Frequency ID (RFID) – tags, transponder
- Global Positioning System (GPS)

An alternative: Enhancing road usage through shadow tolling

A shadow toll is an arrangement between the concessionaries and the government where the latter pays for the all the vehicles passed through the road. Pricing is the only tool to collect revenue for a private player, whereas, the government can additionally impose higher road tax on citizen in means to equate the revenue spent. Charging cess on the fuel is one of many of doing this. Actually, the shadow tolling system makes the road service ‘free of cost’ for the user.

Presently, if the actual traffic is less than the projected traffic, the government simply lengthens the concession period. This worsens the matter as the roads remain under-utilized even for that extended period.

Shadow tolling would notably reinforce smooth flow of traffic on a toll road. Consequently, more users use the road because of the elimination of explicit toll. It also eradicates blockages on the road, i.e. toll booths enhancing the drive and more over resulting in a smoother traffic flow. It also brings down the operational cost of the concessionaires as no toll booths are required, and only electronic scrutiny is adequate.

In short, shadow tolling structure results in smooth traffic flow without any blockages at the toll plaza, lessens the cost of concessionaire and results in higher economic benefits because of optimum road usage, at the same time not resulting to a revenue loss from the government’s point of view. The government should give this modus operandi a serious thought as alternative to reducing toll charges or increasing concession period. This approach is already been put into action in European countries such as UK, Finland and Spain.
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